

MONTHLY WEATHER REVIEW,

FEBRUARY, 1878.

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

:(o):

INTRODUCTION.

In compiling the present Review the following data received up to March 14th, have been made use of viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at one hundred and twenty-eight Signal Service stations and twelve Canadian stations: monthly journals and means from one hundred and thirty-eight of the former, and means from fourteen of the latter; two hundred and fifty-nine reports from voluntary observers; thirty-six monthly reports from United States Army Post Surgeons; Marine records; International Simultaneous Reports; Monthly Reports of the Weather Services of the States of Iowa and Missouri; reliable newspaper extracts and special reports. The most interesting features of the month have been, 1st: The general deficiency in pressure, which has been the most marked in Washington Territory, Oregon, the Gulf and South Atlantic States. 2nd, The continued high temperatures in the Upper Mississippi and Lower Missouri valleys. 3rd, The large number of low areas traced from the Pacific. 4th, The severe storm of the 20th, 21st, 22nd and 23rd, (No. XI). 5th, The general deficiency in precipitation east of the Rocky Mountains, and excessive rain-falls on the Pacific coast, and consequent destructive floods. 6th, The remarkable measured wind-velocity of 150 miles per hour at Mt. Washington. 7th, The tornadoes from the 7th to the 9th. 8th, The severe thunder-storms of the 20th. 9th, The forward state of vegetation in the Western States.

BAROMETRIC PRESSURE.

In General.—The general distribution of atmospheric pressure is shown by the isobars on chart No. II. A comparison with the means for former years show that the pressures have been, in general, below the normal, and that this deficiency is very marked on the North Pacific slope and in the Gulf and South Atlantic States. In Oregon there is a deficiency of 25 hundredths of an inch, and in the latter two districts of 12 to 15 hundredths of an inch.

Barometric Ranges.—The largest and smallest ranges have been respectively as follows: California—Red Bluff, 1.01; Los Angeles, 0.75. Rocky Mountains—Denver, 0.82; Pike's Peak, 0.60. Northwest—Yankton, 1.19; Deadwood, 0.82. The Southwest—Concho, 1.41; Stockton, 0.74. Upper Mississippi Valley—St. Louis, 1.31; Dubuque, 1.08. Upper Lakes—Chicago, 1.17; Marquette, 0.90; Lower Lakes—Detroit and Toledo, 1.16; Oswego, 0.94; Ohio valley and Tennessee—Cairo, 1.33; Knoxville, 1.03. East Gulf States—Vicksburg, 1.12; St. Marks, 0.73. South Atlantic States—Augusta, 0.83; Jacksonville, 0.68. Middle Atlantic States,—Ft. Whipple, 1.03; Cape May, 0.89. New England—Eastport, 1.26; Burlington, 0.86.

Areas of High Barometer in General.—These have been unimportant, furnishing a great contrast to the conditions for February of former years. The consequent absence of cold northerly gales has given the country generally a month of remarkably mild weather, especially in the Upper Mississippi and Lower Missouri valleys.

No. I.—On morning of 1st this area of high pressure covered a small section of the Northwest, evidently advancing from Manitoba. At midnight of 1st it was central at Pembina, barometer, 30.43, (0.30 above normal,) clear, cool weather, calms or light winds. On morning of 2d, accompanied by marked fall of temperature, the ridge of high pressure spreading eastward has extended its limits from Dakota to St. Lawrence valley, being central at Escanaba, barometer, 30.42, (0.40 above normal.) During 2d, clear weather, with calms or light northerly winds, prevailed from Minnesota to New York. On morning of 3rd the central

pressure had slightly decreased and a ridge of equal pressure, with generally clear and cold weather, extended from northern Texas to northern New York, with highest barometer, 30.45, at Port Stanley, Oswego. (0.30 above normal.) During afternoon of 3d the central portion disappeared off the New York coast.

No. II.—This area developing in Montana on 1st, reached Utah on morning of 2d; Salt Lake City, barometer, 30.34, (0.40 above normal.) Reaching Santa Fe, afternoon of 3d, on morning of 4th it had advanced to central Texas, accompanied by clear, cold weather; Indianola, barometer, 30.34. Morning of 5th reached Alabama, with slightly increasing pressure. It was central in North Carolina on morning of 6th, with clear, calm and colder weather; barometer at Wilmington, 30.33. Knoxville 0.23 above normal. That night it disappeared off the North Carolina coast.

No. III.—Appearing in Manitoba on morning 8th; by midnight the barometer at Fort Garry read 30.46. It remained nearly stationary in Minnesota until afternoon of 9th, when it was gradually dissipated by the influence of storm No. V.

No. IV.—This area of high pressure first appeared in SE. Texas on afternoon 10th; clear weather, with brisk, northerly winds, gradually diminishing to calms, prevailed that day; morning 11th, highest pressure noted at Indianola, 30.33; afternoon 11th, it was central at New Orleans, bar. 30.22. At midnight it was central in Alabama, reaching Georgia morning 12th, and disappeared off Georgia coast that evening.

No. V.—This area was first made manifest in clear, cold weather, and rising barometer in Northwest, morning 12th. It first defined itself on the Signal Service maps in St. Lawrence valley at midnight 13th, remaining nearly stationary until morning 14th, with clear weather and low temperatures. Rockliffe, bar. 30.26; ther. -11° . Montreal and Burlington, bar. 0.14 above normal. It was central over Nova Scotia morning 15th, when it disappeared.

No. VI.—This pressure first showed itself above the normal in Alabama morning 16th, and disappeared off the North Carolina coast, forenoon 17th.

No. VII.—This area first defined itself in Minnesota morning 17th, and, at midnight, was central over Michigan, with light northerly winds. Escanaba bar. 30.24. On morning 18th, central over Lake Huron; Saugeen bar. 30.33, 0.25 above normal. Traveling in SSE. direction across New York, the centre, morning 19th, was over Maryland; Washington bar. 30.37, Washington and Philadelphia bar. 0.23 above normal. Clear weather, with fresh northerly winds, prevailed along coast from New England to South Carolina. The area passed off the coast of Delaware evening of 19th.

No. VIII.—This area, morning 21st, was in Quebec. Father Point, bar. 30.20, Chatham, 0.26 above normal. Cold, clear weather, with brisk to high northerly winds prevailed; centre at midnight at Chatham, bar. 30.56, or 0.68 above normal. Highest pressure was morning 2d, Chatham, bar. 30.67, or 0.78 above normal, with temperature -9° . On afternoon highest pressure was central over Nova Scotia; Sydney bar. 30.64, or 0.77 above normal, disappearing next morning off the coast of Newfoundland.

No. IX.—This area probably developed north of Montana, as shown by continued high barometer from morning 22d 'till afternoon 23d, when it appeared in Manitoba, where the pressure steadily increased 'till morning 24th; Ft. Garry bar. 30.27. It moved south down the Missouri valley, and on morning 25th the isobar of 30.30 included this country from Alabama to Dakota, with highest pressure central in Missouri. Morning 26th it was central in Illinois, highest bar., Davenport, 30.55, 0.41 above normal. Clear weather, with light northerly winds, prevailed from Dakota to South Carolina, and from Alabama to Lower Lakes. Morning 27th it was central over Ohio, Sandusky bar. 30.32, Toledo bar. 0.24 above normal. Clear weather prevailed east of Rocky Mountains, save in Gulf and South Atlantic States, which were affected by low area No. XII. Moving south, with diminishing pressure, it disappeared, afternoon 28th, in Alabama.

No. X.—Appears to have formed in Manitoba country, first showing itself morning 28th at Pembina, being central that afternoon over Upper Lakes. At midnight, 28th, with increasing pressure, it was central in Quebec; Rockliffe bar. 30.51, Parry Sound bar. 0.35 above normal.

Areas of Low Barometer in General.—Eleven areas of low pressure are traced upon chart No. I. Low areas Nos. VIII and X are not charted. They are divisible into two groups, viz: Nos. II, IV, V, VI, XI, XII and XIII appeared first on the Pacific coast, and thence moved in a southeasterly track over the Rocky Mountains. The others all first appeared east of the Rocky Mountains.

The storm described as low area No. XII in the January REVIEW continued as a severe northeast gale on the 1st along the Middle Atlantic and New England coasts, gradually diminishing in energy during the day. The following maximum velocities are reported for this storm on the 1st: New Haven, 40 miles, NE.; Boston, 53 miles, N.; Thatcher's Island, 60 miles, NE., and Portland, 40 miles, NE.

No. I.—A low pressure was developed on the morning of the 1st in the West Gulf States. On the 1st and 2nd, accompanied by brisk winds and light rain in the Gulf and South Atlantic States, it moved in a southeasterly path into the East Gulf. On the 3rd it advanced over Florida, and thence pursuing a track nearly parallel to the Gulf stream, it gave rise, on the 4th, to the high winds and heavy rain that prevailed in the South Atlantic States on that day.

No. II.—This depression can be traced from the Pacific. On the 4th there was a rapid fall of the barometer in Oregon, and severe southerly gales prevailed on the Pacific coast on that day. The centre of the low area moved to the southeast, and on the morning of the 5th the lowest pressure was in Wyoming, and thence the low area pursued its southeasterly path, and by the morning of the 6th had developed into a storm of considerable energy, central in northwest Texas. At the a. m. report of the 7th the lowest barometer, 29.49 or 0.65 below the normal, was at Shreveport, La., with the highest pressure in the Middle States. At this time high southeast winds and heavy rains were reported from the East Gulf States, while in Texas the winds had veered to northwest, with colder, clearing weather and rising barometer. The storm, rapidly increasing in energy, had moved by the morning of the 8th into the Ohio valley, where the isobar of 29.30 included both Cincinnati and Louisville, the barometer at the latter place being 0.79 below the normal. On this day there were wind velocities reported from Escanaba of 40 miles, N., and from Cape Lookout 60 miles, SW. The storm-centre then moved, with slightly diminishing energy, over the Middle States, and the wind directions show that, on the morning of the 9th, it had passed beyond the New England coast.

No. III.—This apparently was a subsidiary low area developed from the great depression No. II that crossed from the Pacific ocean. On the morning of the 5th the centre was in Dakota; thence the depression moved slowly to the eastward over Lake Superior, attended by light or brisk southeast winds, veering to colder northwesterly, and occasional light rain or snow, until, on the 7th, it disappeared north of Lake Huron.

No. IV.—This depression is traced from the Pacific. From midnight to the morning of the 6th a rapid fall of the mercury occurred on that coast, and heavy rain or snow fell on that and the succeeding day on the slope west of the Rocky Mountains. At the a. m. report of the 7th the barometer was lowest near Salt Lake. On this day the maximum wind velocity for the month was recorded at Pike's Peak—75 miles, N. The depression moved very rapidly in a southeasterly path, and the morning of the 8th showed a low area in northwest Texas. During the day this depression moved slowly to the east, and during the night to the northeast, and by the morning of the 9th was central in Tennessee and the Ohio valley, the barometer at Louisville, 29.25, being 0.78 below the normal. On the 9th it moved to the east, giving rise, in connection with the rising barometer in the Upper Lakes, to high northeasterly gales in the Lake region. On the 10th the storm-centre passed over New England, where a northeast wind of 44 miles is noted at Eastport, and on the 11th the storm moved beyond Nova Scotia.

No. V.—This low area is traced from the Pacific. The barometer fell rapidly on the Pacific slope on the 11th, and very severe gales, with heavy rain, were reported from that coast on that day. On the morning of the 12th the depression was central in Utah, and then advancing rapidly in a southeasterly track, the low area was, at the a. m. report of the 13th, central in the Indian Territory. During the day thunderstorms were reported from the Gulf States. On the 13th and 14th the low area gradually extended, with frequent rains, over the South and Southwest; but there appears to have been no well-defined storm-centre. On the morning of the 15th a trough of low pressure extended from Lake Erie to the Gulf of Mexico, and during the day this depression was filled up by the inflowing air.

No. VI.—This depression is also traced from the Pacific. The a. m. report of the 13th showed a rapid fall in the mercury in California and Oregon, with heavy rain and high southerly gales. The low area moved, with diminishing energy, in a southeasterly track, and was last noted as an independent depression at the midnight report of the 13th, when it was central in Utah.

No. VII.—On the 13th there was a considerable fall of pressure in Florida and Cuba, accompanied by brisk easterly winds, heavy and frequent rains, with occasional thunderstorms. On the 14th the depression traversed Florida in an easterly track, and was rapidly followed by clearing weather and westerly winds.

No. VIII.—A storm of considerable energy prevailed, with high southerly winds and heavy rain, on the Pacific coast on the 14th. The depression moved, with diminished energy, eastward to the Rocky Mountains, and was there filled up by the inflowing air. Its path was too uncertain to be charted.

No. IX.—On the 15th the barometer fell slowly in the Northwest, and the centre of the low area thus developed moved on the 16th into Wisconsin. On the 17th it advanced over the Lower Lake region and Middle States, and by the a. m. report of the 18th it had gone beyond the New England coast. In its passage it was accompanied by brisk but not high winds, and frequent but light rain fell to the south of its track and light snow to the north.

No. X.—During the night of the 15th and 16th there was a rapid fall of the mercury on the Pacific coast, with severe southerly gales and heavy rain. The storm was followed by rapidly rising barometer. Its track was too indefinite to be charted.

No. XI.—This depression is traced from the Pacific. On the 17th there was a decided fall in the barometer in Washington Ty. On the 18th the fall had extended to the Northwest. On the 19th the centre of the depression moved in a southerly track into Missouri. On the 20th the lowest pressure was transferred to the Indian Ty. On that day the storm increased very rapidly in energy. Several thunderstorms were reported from the Gulf States and Tennessee, while the rain-area extended over the Ohio valley, Lake region and the Middle States, with snow in New England. The same day the pressure fell 0.93 below the normal at Fort Gibson, and more than 0.80 below the normal at Ft. Sill, Denison, Corsicana, Shreveport and Memphis. On the 21st, the storm still increasing in energy, became central in the Ohio valley, and on the same day the barometer rose very rapidly in New England and Nova Scotia. The pressure at the cen-

tre of the depression continued during the day below 29.20, and the following pressures were noted below the normal: Memphis, 0.92; Cairo, 0.89; Louisville, 0.85. The morning report of the 22d shows the lowest pressure in Indiana, with the barometer still rapidly rising in Nova Scotia. At this time the isobar of 30.60, with an average temperature of $+10^{\circ}$ extended from Father Point, Can., slightly to the east of Eastport, Me., the isobar of 29.60 with an average temperature of $+50^{\circ}$ extended from Baltimore, Md., to Erie, Pa. Both the temperature and pressure gradient indicated the severe gales that were felt on the New England and Middle Atlantic coasts on that day. At the a. m. report of the 23rd the centre of the low area had moved into Canada near the Georgian Bay. It then advanced with rapidly diminishing energy in an easterly path, into Nova Scotia and disappeared on the 24th beyond that coast. This was an unusually severe storm, and during its passage from the Pacific to the Atlantic the following high velocities are reported: 17th, Red Bluff, Cal., 44 miles, SE.; 20th Dodge City, Kan., 60 miles N.; Stockton, Tex., 52 miles W.; New Orleans, 40 miles SE.; Mobile, 42 miles SE.; 22d, New London, Conu., 80 miles E.; 26th, Mt. Washington, 150 miles N.

No. XII.—On the 23rd the mercury fell in Oregon, with southerly winds and frequent rains; the centre of the low area moved in a southerly track along the coast, and at midnight of the 24th it was near San Diego, Cal. On the 25th it moved rapidly in a southeasterly track, and at the a. m. report of the 26th, the centre of the low area was situated to the south of Brownsville, Texas. On the 26th it moved over the Gulf in an easterly track, and was accompanied in the Gulf States by easterly winds backing to northwest. On the morning of the 27th it was central in southern Florida, and on that day moved to the east beyond the coast. The rain-fall in southern Florida was excessive. During its passage the following maximum wind velocity was reported: 22d, Indianola, Tex., 84 miles N.

No. XIII.—On the 25th and 26th there was a general fall of pressure on the Pacific coast, with heavy rain and southerly gales. On the 27th the centre of the low area had moved into Utah, and on the 28th, still pursuing a southeasterly track, it had advanced into Texas.

As illustrating the service of the telegraph lines of the Signal Service and the signal stations established along the lines, equipped, as they are, for communicating with vessels in either the International Code or Signal Service Code, it may be stated that the Italian bark Giuseppe Massano, Captain Meretto, ran ashore near Cape Henry, Va., and was reported to the Signal Station at 6:55 a. m. of the 10th. Information was at once sent to the Chief Signal Officer at Washington, and assistance thence asked from Norfolk. It was attempted by Cape Henry station to open communication by means of the flags of the International Code, but receiving no response from the ship, Private Harrison, fully equipped with flags, etc., of the Signal Service apparatus, was sent aboard to open communication with the shore, which he did with very good result. The following appears in the report of Sergeant Bell, in charge of Signal Station at Cape Henry: "At one time during the morning, (11:30 a. m.) when the crew abandoned the vessel, and the captain and first mate were preparing to abandon her, Private Harrison informed the captain that he should have more confidence in his signaling, and that by this means he would keep him fully informed of all particulars from shore, which eventually proved the means of saving the ship from total loss, and she was subsequently removed with but slight damage by the wrecking steamer from Norfolk, summoned by means of the coast lines. Again near Cape Hatteras on the 22d, a vessel was noticed flying a signal of distress. An unsuccessful effort was made to open communication with her by means of the flags of the International Code. The life-saving station, twelve miles distant, was notified by messenger. Later in the day, and before assistance could reach her, the vessel drifted out to sea. Information had been sent as soon as the distress-signal was noticed to Norfolk by means of the sea-coast telegraph line, and the United States revenue-cutter Hamilton, Captain Irish, sailed to her rescue from that port. This revenue-cutter arrived off Hatteras Signal Station the next morning, and without landing opened communication with that station by the Signal Service Code—by which messages of any character may be communicated—learned all particulars in reference to direction in which vessel was last seen and other matters in reference to her, steamed to sea in search, and found two days later the schooner H. C. Cushing, of Boston, abandoned and in a sinking condition, near the Gulf Stream.

INTERNATIONAL METEOROLOGY.

October 7th to 12th, great storm along the entire coast of China, followed by extraordinary cold NW. winds. 14th, latitude $43^{\circ} 30' N.$, $60^{\circ} W.$, hurricane, WNW. to W., lasting 12 hours, with lightning and heavy rain. 16th, off Cape of Good Hope, heavy SW. gale. 21st, $29^{\circ} 24' N.$, $132^{\circ} E.$, gale. 22d, $54^{\circ} 14' S.$, $76^{\circ} 14' W.$, gale. November 5th, $34^{\circ} N.$, $136^{\circ} E.$, gale. 20th, off Cape of Good Hope, gale. 22d, $43^{\circ} 4' N.$, $125^{\circ} W.$, gale. 23d, $46^{\circ} 49' N.$, $125^{\circ} W.$, gale. December 10th, between Tortugas and Cape Florida light, heavy NE., gale; latitude $44^{\circ} 7' S.$, longitude $30^{\circ} 57' W.$, terrific gale, with tremendous sea. 23d, off island of Grand Cayman, Carribean sea, NW. gale. 26th, $36^{\circ} 25' N.$, $2^{\circ} 5' W.$, heavy gale; off coast of Chili, gale. 30th, 20 miles SE. off Hatteras, terrific NNW. gale, lasting 3 days. January 1st, heavy gale off St. Catharine, Bermudas. 5th, $17^{\circ} 21' N.$, $58^{\circ} 36' W.$, hurricane. 6th, $25^{\circ} 33' N.$, $72^{\circ} 71' W.$, heavy NE. gale, lasting 20 hours. 10th, $30^{\circ} 35' N.$, $74^{\circ} W.$, hurricane from SE., lasting 7 hours. 11th, $38^{\circ} N.$, 70° to $72^{\circ} W.$, hurricane SE. to N., lasting 7 hours; $37^{\circ} 02' S.$, $22^{\circ} 43' E.$, very heavy W. gale, lasting 12 hours. 13th, $40^{\circ} 38' N.$, $68^{\circ} 52' W.$, strong WNW. gale. 14th, $37^{\circ} 71' N.$, $71^{\circ} W.$, hurricane from SE. to SW. 19th, $30^{\circ} N.$, $50^{\circ} W.$, heavy gale from SE. to N.; about $30^{\circ} N.$, $50^{\circ} W.$, hurricane from SSE., lasting 24 hours. 23d, $50^{\circ} 13' N.$, $22^{\circ} W.$, strong WNW. gale; $45^{\circ} N.$, $163^{\circ} W.$, hurricane winds for 2 hours, barometer 28.34; British Isles, gales. 24th, $50^{\circ} 10' N.$, $26^{\circ} 48' W.$, and $49^{\circ} 38' N.$, $26^{\circ} 17' W.$, strong WNW. gales; $49^{\circ} 40' N.$, $7^{\circ} 22' W.$, NW. gale, with heavy squalls and hail; $44^{\circ} 03' N.$, $56^{\circ} 11' W.$, strong